

CLAIMS

1. A method for forming an electronic device having a semiconducting active layer comprising a disc-shaped molecular material, the method comprising aligning columns of the disc-shaped molecules parallel to each other by bringing the disc-shaped molecular material into a liquid crystalline discotic phase.
2. A method as claimed in claim 1, wherein the device is a transistor.
3. A method as claimed in claim 1 wherein the step of bringing the disc-shaped molecular material into the liquid-crystalline phase comprises heating the disc-shaped molecular material.
4. A method as claimed in claim 3, comprising the step of quenching the disc-shaped molecular material subsequent to the said heating.
5. A method as claimed in claim 4, wherein the said quenching step is such as to form the disc-shaped molecular material into an amorphous glassy state.
6. A method as claimed in claim 1, comprising forming source and drain electrodes of the transistor in locations relative to the active layer such that the channel of the transistor is oriented parallel to the alignment direction of the columns of molecules.
7. A method as claimed in claim 1, comprising depositing the disc-shaped molecular material on top of an alignment layer capable of inducing the said alignment of the columns of molecules.
8. A method as claimed in claim 7, comprising the step of forming the alignment layer by mechanical rubbing of a substrate.
9. A method as claimed in claim 1, wherein the disc-shaped molecules are conjugated molecules.
10. A method as claimed in claim 1, comprising the step of depositing the disc-shaped molecular material from solution.
11. A method as claimed in claim 1, comprising the step of forming an active interface of the transistor by solution deposition of a dielectric polymer layer on top of the disc-shaped molecular material.
12. A method as claimed in claim 1, wherein the columns of molecules are arranged in uniaxial alignment.

13. A method as claimed in claim 1, wherein the columns of molecules are arranged in uniaxial, monodomain alignment.

14. A method as claimed in claim 1, wherein the columns of molecules are aligned in domains of local parallel alignment.

15. An electronic device formed by the method of claim 1.

16. A logic circuit comprising a transistor as claimed in claim 15.

17. A logic circuit as claimed in claim 16 including at least one optical device.

18. An active matrix display comprising a transistor as claimed in claim 15.

19. An electronic device having a semiconducting active layer comprising a disc-shaped molecular material in which columns of disc-shaped molecules have been aligned parallel to each other by bringing the disc-shaped molecular material into a liquid-crystalline phase.

20. An electronic device as claimed in claim 19, wherein the device is a transistor.

21. An electronic device as claimed in claim 19, wherein the device is a thin-film transistor.

22. An electronic device as claimed in claim 20, wherein the channel of the transistor is oriented substantially parallel to the direction of the aligned columns of molecules.

23. An electronic device as claimed in claim 19, comprising an alignment layer directly underlying the active layer.

24. An electronic device as claimed in claim 22, wherein the aligned columns of molecules are semiconducting columns of molecules.

25. An electronic device as claimed in claim 24, wherein the aligned columns of molecules are in an amorphous glassy state.

26. A method for forming an electronic device having a semiconducting active layer comprising a disc-shaped molecular material, the method comprising aligning columns of the disc-shaped molecules within domains by bringing the disc-shaped molecular material into a liquid-crystalline phase.

27. A method for forming an electronic device having a semiconducting active layer comprising a disc-shaped molecular material, the method comprising aligning columns of the disc-shaped molecules as a monodomain oriented in a preferred uniaxial direction within the layer of the electronic device by bringing the disc-shaped molecular material into a liquid-crystalline phase.

28. A transistor device comprising a disc-shaped molecular material having a discotic liquid crystalline phase.